

**FIXED CONTENT DISTRIBUTED DATA STORAGE  
USING PERMUTATION RING ENCODING**

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**ABSTRACT OF THE DISCLOSURE**

A file protection scheme for fixed content in a distributed data archive uses computations that leverage permutation operators of a cyclic code. In an illustrative embodiment, an  $N+K$  coding technique is described for use to protect data that is being distributed in a redundant array of independent nodes (RAIN). The data itself may be of any type, and it may also include system metadata. According to the invention, the data to be distributed is encoded by a dispersal operation that uses a group of permutation ring operators. In a preferred embodiment, the dispersal operation is carried out using a matrix of the form  $[I_N \ C]$  where  $I_N$  is an  $n \times n$  identity sub-matrix and  $C$  is a  $k \times n$  sub-matrix of code blocks. The identity sub-matrix is used to preserve the data blocks intact. The sub-matrix  $C$  preferably comprises a set of permutation ring operators that are used to generate the code blocks. The operators are preferably superpositions that are selected from a group ring of a permutation group with base ring  $Z_2$ .

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